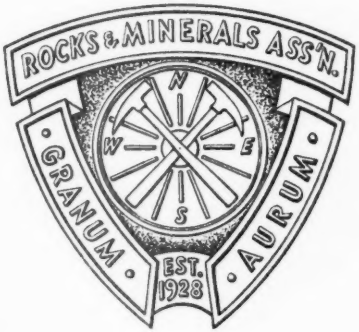
ROCKS and MINERALS

A Magazine for Mineralogist, Geologist and Collector . . .



. . . . . *Official Journal of The Rocks and Minerals Association*

. . NOVEMBER, 1937 . .

Vol. 12 No. 11 TWENTY FIVE CENTS Whole No. 76

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ROCKS and MINERALS

PUBLISHED MONTHLY

Edited and Published by
PETER ZODAC

NOVEMBER
1937

CONTENTS FOR NOVEMBER, 1937

Pyrite, Leadville, Colorado ..... Frontispiece
Chips from the Quarry 324
The Terlingua Quicksilver District of Brewster County, Texas. By Frank Duncan 325
Some Minerals of the Gillette Quarry, Haddam Neck, Conn. By Sterling G. Gillette 333
John Doe Among the Dinosaurs. By Walther E. P. Huebner 334
Motion Picture photography of Mineral Specimens. By J. K. Fisher ... 338
Fossil Pearls. By W. E. Howarth 340
N.G.C. Adopts **Rocks and Minerals** 340
The Devil's Corkscrews 341
Discovery of a Mastodon Skeleton Near Aurora, Ill. By Mrs. Florence Anderson 342
Newark Mineralogical Society 343
A Block of Salt From Palestine 343
With Our Authors 343
The Amateur Lapidary. Conducted by Arthur Knapp 344
A Suggestion to Amateur Cutters of Cabochons. By Dr. Frank B. Wade 344
An Early Gold Rush to Baffin Land 351

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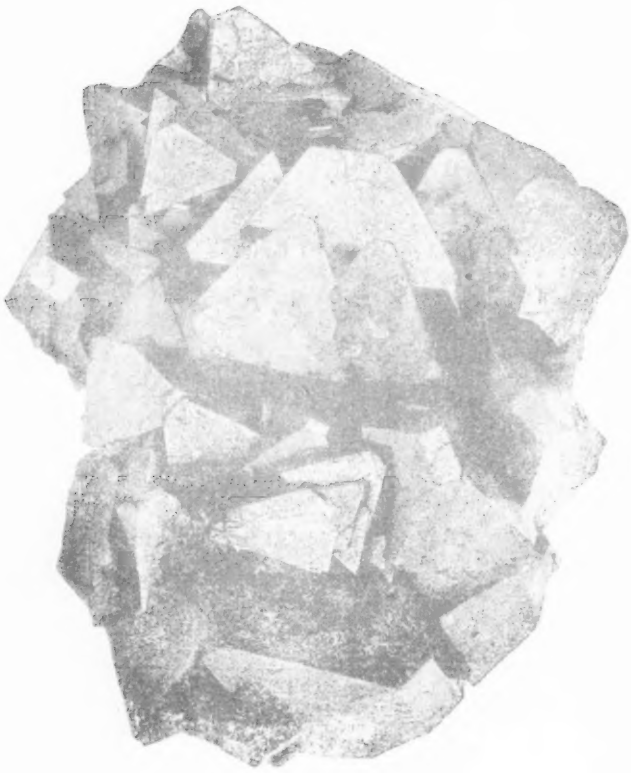

PYRITE
Leadville, Colorado

PYRITE

This pale brassy metallic mineral, an iron disulphide in composition, masquerades under a number of names—Pyrite, iron pyrite, sulphur diamond, coal diamond, mundic, sulphuret of iron, bisulphuret of iron, iron sulphide, iron disulphide, fool's gold, hexahedral iron pyrite, auriferous pyrite, miner's diamond are but some of the names given it. When it is cut and polished it is sold under the name of marcasite, although scientifically marcasite is the name which is given a whitish variety of iron disulphde which is distinct from pyrite.

Pyrite has caused more heartaches than any other mineral in the world because amateur miners and prospectors, landowners and others who know little about mineralogy, have mistaken it for gold. Many shafts and tunnels have been sunk or driven, and hundreds of thousands of dollars expended in useless effort to work a mine for gold whose chief ore is ordinary pyrite. A story is told of two brothers who were sadly fooled by pyrite at an old iron mine in Putnam Co., N. Y., many years ago. A lot of pyrite was uncovered at that time when the mine was in operation, and the material was carefully placed away in a readily accessible spot by the foreman emphasizing its value with a twinkle in his eye.

The two brothers (amateur prospectors) keenly noted the spot where the pyrite was stored and returned that night at 12 o'clock and proceeded to load their potato sacks with the "gold". They then hiked four miles through the woods with the heavy burdens on their backs. What happened to the pyrite after it was brought home was never learned but the brothers were always kidded about their hoard.

Although pyrite is commonly called fool's gold because it is frequently mistaken for the precious metal, it sometimes does contain gold and is then mined as an ore of gold. A gold bearing pyrite is known as auriferous pyrite.

Pyrite is a pale brassy metallic mineral consisting chiefly of iron and sulphur. It is brittle and hard, (H 6-6.5) so that it can not be cut with a knife, and when hammered it shatters into innumerable pieces. Gold is so soft that pieces can be cut off with a knife and when hammered it is flattened into thin sheets.

Pyrite is a very common mineral and is found in all type of rocks. It may occur in crystals—generally as cubes, whose faces are often striated—as veins, thin sheets, masses, globules, concretions, and stalactitic forms.

Very fine cubes often of great size have been found in the mines of Cornwall, England; on the Island of Elba, and elsewhere. The mines and quarries of Europe and South America have afforded many magnificent specimens.

In western U. S., magnificent cubes have been found at Leadville, Colo., and at Bingham Canyon, Utah. Perhaps the best known esatern locality at the present time is the talc mine at Chester, Vt. where burnished cubes of pyrite occur in talc.

Pyrite received its name from the Greek for "fire" because they thought it contained much of it alluding to the fire given off when struck with steel.

CHIPS FROM THE QUARRY
(EDITORIAL PAGE)

Boodle Lane to Give Illustrated Talk In Boston

Mr. Boodle Lane of Galena, Kansas, will deliver a talk illustrated by lantern slides, at 7:30 P.M. Sat., Nov. 6th at the Museum of Natural History, 234 Berkeley St., Boston, Mass.

During the day Mr. Lane will have on sale a display of some of the finest specimens from the world famous Tri-State area. The public is invited to attend both functions.

Editor and President Attend Conference

Peter Zodac, editor of **Rocks and Minerals Magazine** and R. Emmet Doherty, president of the Rocks & Minerals Association attended the 33rd New England Intercollegiate Geological Conference held at the Grand Concourse Plaza Hotel in New York City October 8th, 9th, and 10th, 1937.

Representatives from most of the colleges and universities in northeastern United States were present, the largest number coming from Columbia University in New York City.

Many fine field trips were arranged by the Conference, the one which the Rocks and Minerals representatives attended was a visit to the Seismology Station of Fordham University. The vault for recording earth tremors is located thirty feet below the university campus and the delicate instruments contained herein are so sensitive that they even record the slight tremors caused by passing railway and subway trains.

Fifteen members of the Rocks and Minerals Association were recognized and no doubt many other members were among the diners noted at the banquet held on the evening of the 8th. The officers of the Conference are to be congratulated on the efficient manner in which the three day activities were conducted.

Eyles Opens Mineral Store

We are pleased to announce that one of our good friends, Wilfred C. Eyles, a member of the ROCK & MINERALS ASSOCIATION in the land of sunshine and flowers—namely California—has entered the mineral business on a full time scale. He has opened a mineral store under the name of Western State Mineral & Gem Co. and is located at 5051 Geary Boulevard, San Francisco.

We extend Mr. Eyles our hearty congratulations and wish him the utmost success in his new venture. His ad appears on page 349 of this issue.

New Rate Pleases

The increase in subscription rates has met with a warm response—not one subscription having been lost thereby. On the contrary a host of new subscriptions have been received while hundreds of subscribers have rushed in their renewals or extensions while the old rates were still in force. Many of our friends deliberately waited for the new rates to go into effect before renewing.

The following two letters are typical of many received recently:

Dear Editor:-

Enclosed you will find P.O. money order in amount to renew my subscription two more years. I am glad to help you carry on the good work you are doing and believe you truly must have a love for mineralogy as the class of magazine you give your subscribers must make your profits very small.

I. Harold Soper
San Francisco, Calif.

Dear Editor:-

I deliberately held back my renewal so that the new rate may be in effect.

Peter Thein,
Brooklyn, N. Y.

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NOVEMBER . . 1937 . .

VOL. 12 NO. 11

The Official Journal of the ROCKS and MINERALS ASSOCIATION

WHOLE NO. 76

THE TERLINGUA QUICKSILVER DISTRICT OF BREWSTER COUNTY, TEXAS

By FRANK DUNCAN
Terlingua, Texas

This attempt of the writer to express in words what he knows of the Terlingua Quicksilver District may not be as satisfactory as it might be if he were a more capable writer and therefore more competent to do it justice. However, he will do his best to convey to the reader as many of the facts and as good a description of this little known part of the State of Texas which is often referred to as the "Last of the American Frontier."

Location

Terlingua is in the southern part of Brewster County near the southern part of the Big Bend country of the Rio Grande. It can be reached either from Alpine, the county seat, or from Marathon, a small town 30 miles east of Alpine. The writer will direct from Alpine.

Alpine is located on the Southern Pacific and the Santa Fe Railroads and is on National Highways 67, 90 and 97. These highways are paved or are being prepared for paving. Most of the unpaved are graded dirt roads and usually in good shape except when muddy from occasional rains during the summer months. Alpine is around 5,000 population, has a good hotel, tourist camp, and other modern conveniences. The Sull Ross State Teachers College is located on College Hill, just east of the town. On Highway 90, just south of the college buildings, is Camp Grande, from where you will turn off from the highway on the Terlingua road. You will cross the Southern Pacific R. R. tracks and go south for several blocks, then west a block and south through a fenced lane. You are now on the main road which is graded and usually in fair condition. It is 85 miles from Alpine to Terlingua.

About three miles out you will begin to climb a stiff grade winding over the mountains. Near the summit you can get a fine view of the many lofty mountain peaks in the locality. Twin Peaks, Twin Mountains, Paisano Peak, and many others lie to the west. Mitre Peak to the northwest while Mount Ord will face you on the southeast. You are now at an elevation around 6,000 feet but will be descending from here on to Terlingua. A few miles more and you will get a good view of Cathedral and Bear Mountains to the west. This is a stock raising country and many of the finest herds of Hereford cattle in the United States are raised here. Some of the ranches are also stock with sheep.

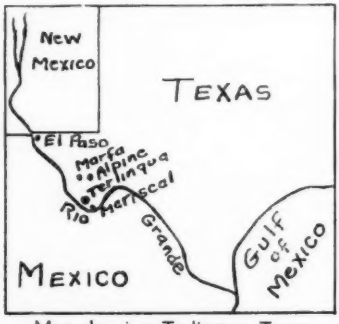
Twenty-two miles out, you will cross Calamity Creek bridge over a flowing stream of fine water. About 30 miles out, you will drop into Green Valley and the road will parallel lofty Elephant Butte on your left. After this mountain is passed, a good view of old Santiago Peak, to the east, will be had. About 50 miles out, the country be-

comes slightly rolling, the grass changes to brush, and the general country undergoes a transformation. To the south can be seen the Christmas and Chisos Mountain ranges. You will also pass Nine Point Mesa on your left. At about 70 miles from Alpine, you will begin to drop down over a winding road into a country that is hard to describe. It is the heart of desolation. The most weird country you ever saw. Though the area is badly cut by erosion and with little vegetation, nevertheless, one is astonished by the coloring of the landscape—whites, reds, blues, yellows, greens—everywhere and beautiful.

At 77 miles out, you will cross Terlingua Creek. Watch this creek if there had been any rains as it is very dangerous when high. At 85 miles out, you will suddenly come upon the town of Terlingua. It will have the appearance of a typical Mexican village with its small rock and adobe houses.

Layout

The Chisos Mining Co., which supports the Mexican population, has many substantial buildings in Terlingua. Its Commissary Building contains the Post Office and a store which carries a large stock of general merchandise, groceries, gasoline and oils. The company also maintains a hotel for the convenience of its employees and for visitors. The officials are very hospitable and courteous. Mr. Robert Carteledge is the General Manager of the Chisos Mining Co., whom one would have to see to obtain permission for visiting the mines which are in Terlingua. He is a very nice man to meet and having lived here for many years is well acquainted with the district. Mr. Babb, the Postmaster, a very obliging gentleman, is another official that you should meet. Mr. Howard E. Perry, of Portland, Maine, owns the Chisos mines, as well as a coal mine and another quicksilver mine at Mariposa, about 7 miles to the west of Terlingua, from which the ore is hauled to the furnace at Terlingua. Just west of the Chisos mines are the Rainbow mines where you will meet Mr. Starr, the manager, a very entertaining gentleman.



Map showing Terlingua, Texas.

Four miles east of Terlingua is located one of the mines owned by E. A. Waldron who is now sinking a shaft on the property. His superintendent, Mr. Joe White, has been raised in the district and through his long experience not only knows his mining but can handle the retorts and furnaces.

Six miles east of Terlingua at Study Butte, is the Brewster Consolidated. This mine differs in respect that the cinnabar is deposited mostly in rhyolite and andesite. The others are in limestones and shales.

Four miles west of Terlingua are the headquarters of the Waldron properties known as "38." Here is a Scott furnace which has an improved condenser system devised by Mr. Waldron. He also has a fine battery of retorts of the Johnson & McKay type. It consists of 12 tubes which are heated by two fire boxes. This property has produced considerable quicksilver in the past. It was purchased by Mr. Waldron from the Colquitt and Tigner estate and is located in the northwest corner of Section 38. ..Little "38" is located in the Southeast corner of section 38, and was formally operated by the owner, Warren F. Oakes There are many fine specimens of calcite, aragonite and barite to be found in the old dump. Much rich cinnabar was mined here in the past. It is understood that Mr. Oakes intends to reopen it in the near future.

Joining section 38 on the west is section 39, also owned by Warren F.

Oakes, which produced high grade ore when operated. This was Mr. Oake's headquarters, and where he had his furnace. Section 40 lies west of 39. The Old Dewees Mine was located in the southeast corner, and was the first mine to be operated in the district. It is now owned by E. A. Waldron, who produced considerable quicksilver here in 1935. He expects to operate again soon. South of Section 40 is section 59, which formally was owned by James Norman, and is a part of the former Mariposa Mining Co. It is now owned by Howard E. Perry who is doing new development and producing some good ore.

Mr. Perry also owns section 41, which lies west of section 40. It has been worked profitably in the past and is known to contain high grade ore.

West of section 41 is 44. There are a number of patented claims in the southeast part of this section which has recently been leased and operations will commence in the near future. The writer has three claims in this section which were formally owned and operated by Colquitt and Tigner. Considerable good ore was produced by them, but operations ceased when the owners died. A large amount of furnace ore is still on the dumps. The writer has a battery of three tube retorts located on one of the claims. This property is capable of large development.

Several miles west and north of this section is a new strike owned by Wilson and Smith who are now developing the property.

Just west of Section 59 lies section 58. This was formally owned by the Mariposa Mining Co. There are four claims here owned by Warren F. Oakes on which the furnaces of the Mariposa Mining Co. used to stand. Joining these to the south are three claims owned by the writer, who, when able, has produced considerable cinnabar from surface workings.

With the exception of the Mariscal mine which lies about 35 miles southeast of Terlingua, these are all of the prominent mines of the Terlingua district. However, several new ventures are now under way.

History

While it would take quite an article to give much of the history relative to the discovery of cinnabar in the district, the writer will touch the subject only briefly. For those interested a very comprehensive report is "The Terlingua Quicksilver Deposits" by Benj. F. Hill. The writer has drawn freely from this report on matters which happened before his acquaintance with the district.

. . According to Dr. Hill, "At Comanche Spring, is a small "seep" seven miles north of the Rio Grande. The gray limestone bluffs have been covered with rude paintings of characteristic Indian designs. The artists were without doubt the Comanche Indians, and the vermillion pigment used by those aboriginal artists was prepared from cinnabar." When the writer first came to this district, the paintings were still in excellent condition. But in the last 20 years they have been mostly cut out and carried away, or destroyed by high water. California Hill and vicinity was undoubtedly the source from which the Comanches obtained their cinnabar. It is about three miles north of Comanche Spring.

Furthermore Dr. Hill stated that Mr. Geo. W. Wanless, of Jimines, Mexico, and Mr. Chas. Allen of Socorro, New Mexico, had been informed by the Mexicans of deposits of cinnabar in the vicinity of California Hill, and they made a trip to the locality and located claims, about the years, 1894 or 1895. Shortly after this time Prof. Wm. P. Blake and Mr. Jos. P. Chase of New Mexico, visited the locality and Prof. Blake's description of the deposits, published under the title of "Cinnabar in Texas" in the transactions of the American Institute of Mining Engineers, Vol. XV, Page 68, is the first notice of importance of the region.

. . By 1898 many claims had been taken up and several ore deposits developed. Up until this time the cinnabar had been handled by retorting, but a ten ton furnace was erected by Mr. Robert Scott of

California in that year for Messrs. Norman, Sharpe and Golby on their claims on section 38. This furnace was later increased to 20 ton capacity.

In 1901 Mr. Norman and associates purchased the California Hill property, which included all of sections 59 and 41. They organized the Marfa and Mariposa Mining Company. Most all supplies were hauled from Marfa, Texas, the county seat of Presidio County, a distance of over 100 miles over bad and mountainous roads. Mexican mule teams were used. This property had a record of producing 40 flasks of quicksilver per day for 20 years. Mr. Norman lived in Marfa, became afflicted with heart trouble and his physician advised him against making trips to the mine. It is said that he remarked he had made more than he would ever be able to spend, and so gave the property, of which he was then sole owner, to another countryman by the name of Alfred Newell. Both men were natives of England.

In 1918 Mr. Newell sold out to Mr. Dansy of Pennsylvania. During the war the U. S. Government bought vast quantities of quicksilver, which was used in making high explosives, and at the end of the war the Government dumped upon the market a reserve of more than 60,000 flasks, which was as much as could be used by the entire industry of the U. S. A. for at least three years. This paralyzed the quicksilver industry of the whole country, and caused all the mines of the Terlingua District to close down except the Chisos Mining Co. who continued with development work. The Mariposa Company was later sold to different interests. Part of the property was purchased by Warren F. Oakes, and the sections 41 and 59 by Mr. Perry, while some of the claims were allowed to forfeit. These included claims later taken up by the writer of this article, on section 58. Practically all of the furnace, machinery and equipment was dismantled and hauled away. However, Mr. Perry is now developing new workings in the California Hill and hauling the ore to the furnace at Terlingua.

Many of the other mines that closed after the war were either sold, or have never been opened up again. The mines now operating are all under new ownership with the exception of the Chisos Mining Co., which has been in practically continuous operation since 1902. It is stated that it has a record of $21,000,000 in 20 consecutive years. This was produced from a Scott furnace of 20 ton capacity, with the exception of a short time during the war, when a 100 ton rotary furnace was installed, similar to those used in Italy. However, it did not give very satisfactory recovery and has not been used since then.

The Rainbow Mines have a Nichols-Hereshoff Furnace, which is said to give a very good recovery. The Brewster County Consolidated, formally the Study Butte Mine, has a 30 ton capacity Gould Rotary Furnace which is said to give a fair recovery with the ore found in this mine. The ore in the above mine contains a large marcasite and pyrite content, which makes it somewhat refractory in extraction.

The above mine in Study Butte is noted for its large body of low grade ore. They have some water trouble, but at this time it is well under control. The water has a strong sulphur and iron content and cannot be used for industrial and domestic purposes. However, they have an unlimited supply for such purposes in Terlingua Creek less than two miles distance.

Geology

The prevailing rocks of the district are sediments of Upper and Lower Cretaceous age cut by Tertiary volcanics. Udden says "Cinnabar is here found in quite diverse kinds of rocks, ranging from the Edwards limestone in the Comanchean to the sandstones of the Rattlesnake beds in the Upper Cretaceous. It also occurs in some igneous rocks which intrude these sediments. * * * Under all circumstances it would seem that the cinnabar is not limited in its occurrence here to any particular forma-

tion. That the source is deep-seated may also be infered from the fact that the mineral is distributed over a fairly wide area extending from the Mariscal Mountains on the east to Lajitas Mesa on the west, and from beyond the Mexican boundary on the south to the Christmas Mountains on the north. The known east and west extension is at least twenty miles."

The real producers so far in the district lie in an east and west belt about two miles wide by eighteen miles long. This may be due partly to erosion uncovering more deposits along the belt.

Practically all of the mining has been done in the Georgetown and upper part of the Edwards limestones. No attempt has ever been made to explore below the Edwards limestone, which is probably near a thousand feet thick. However, there is a thick layer of coarse sands capped by marls and shales at its base, which is probably at least 250 feet in thickness. This is plainly in evidence in the exposure of the great fault at the mouth of the Grand Canyon, south of California Hill, as well as other faults along the Rio Grande. The deepest workings so far in the Edwards do not exceed 470 feet. Cinnabar still continues downward in the calcite veins. It is the opinion of the writer that the pervious sands just below the Edwards shou'd be the proper place for the richest deposits to occur. The deposits that have been worked, and are now being worked, are purely of "outcrop" nature.

In limestone, cinnabar occurs chiefly in fissures and faulted zones. The fissures are generally vertical, although when steeply inclined, bedding planes between layers of limestone become dipping veins for deposits. There is much evidence that this district contained many hot springs and geysers in the past. There are at this time hot springs along the Rio Grande. Hot springs undoubtedly were the sources of the magmatic waters which brought the cinnabar in solution and also in suspension, as the mineral is so often found in "paint" or extremely finely divided particles which are found scattered in fine seams in calcite and other gangue minerals in the veins. These seams are sometimes quite wide and lend themselves to rich grading of the ore. This is a great advantage as a small furnace will take care of quite a large mine, and accounts for the high percentage of recovery per ton, as a very small percentage of waste need be allowed to enter the furnace.

Minerals of the District

Although the list of minerals is not extensive, it is interesting to note that four minerals new to science, eglestonite, montroydite, mosesite and terlinguaite, were discovered in the ores of the Terlingua district. The minerals occurring here are as follows:

Analcite: Lonsdale[1] reports the mineral as occurring in small light gray to white crystals, some of which were coated with asphalt from a seep in the workings. The crystals were on an altered basalt and were found on the dumps of an abandoned mine.

Aragonite: Common in the western part of the district and occurs in many varieties.

Asphalt: See Analcite.

Barite: Found on dumps of Little 38 in fine specimens; occurs at other mines also.

Calcite: In that the sedimentary beds are principally crystallized limestones thousands of feet in thickness, it is natural that calcite would be one of the chief minerals present. In fact it is so abundant that the writer never saw so many forms of calcite anywhere as is here present. Surface outcrops, however, do not produce good specimens but in vugs of many mines excellent specimens, some containing phantoms, are to be had.

---

[1]Lonsdale, John T. **Analcite from Brewster County, Texas.** Am. Min. Aug. 1928, p. 449.

Calomel: Tetragonal. Hg_2Cl_2. Is commonly in very minute crystals of prismatic form, yellow or brownish in color, and usually associated with eglestonite and native mercury. H. = 1.2 Sp. Gr. 6.4.

Cinnabar: This is the chief ore mined, dull red to brick red in color, and granular to earthy in structure. It occurs chiefly in limestone but is also found in shales, rhyolite and andesite. Cinnabar is mercuric sulphide, HgS.

Eglestonite[2]**:** Hg_3Cl_3O. Occurs in minute dodecahedral crystals (isometric), light yellow to dark brown, rapidly darkens on exposure to sunlight becoming finally black. Streak yellow but rapidly becomes black on exposure to light. H. 2-3, Sp. Gr. 8.3. Transparent. Associated with calcite, calomel, montroydite, native mercury, and terlinguaite. Named after Prof. Thomas Egleston (1832-1900) of Columbia University, New York.

Gypsum: This also is common, especially in the strata of Del Rio clay between the Buda and Georgetown limestones; also occurs in the strata above the Eagleford shales.

Kleinite[3]**:** Occurs in small prismatic crystals yellow to orange in color. The mineral has the peculiar property of changing its color when exposed to light (darkening immediately to reddish orange) but regaining its original color when placed in the dark. Streak same as color. H. 3.5. Sp. Gr. 7.9. A mercury ammonium chloride of uncertain composition. Found on the properties of the Marfa and Mariposa Mining Co., associated with barite, calcite, gypsum and with other mercury minerals of the locality. Named after Prof. Carl Klein, an eminent mineralogist.

Limonite: Found in the oxydized zones of many deposits.

Marcasite: Plentiful in many mines.

Mercury (Native): Frequentiy seen scattered through rock in fine globules sometimes as large as No. 4 shot. Also found saturating rock, usually limestone, but so finely divided that it would be invisible to a 20 power glass but it would be so plentiful as to make the rock extremely heavy. In fact the writer saw some 30 tons mined about two years ago which ran about 1,000 pounds of mercury per ton. The writer has been told that as much as 700 pounds of native mercury was once found in one pool; this he cannot vouch for but it would not be impossible.

Montroydite[1]**:** Orthorhombic, HgO. In minute prismatic crystals, highly modified; also forming velvety crusts. H.1.5-2; Sp. Gr. undetermined. This interesting mineral is not found any longer. It has many forms but the most interesting is that of worm-like masses of minute prismatic crystals of brown to orange color which are quite flexible but not elastic. Also occurs in long slender hollow crystals and in minute geodes containing dark red crystals; also in a brilliant orange colored powdery form. The larger crystals are red in color and resemble realgar and vanadinite; other colors are brownish-red, orange, brown to almost black (probably due to exposure to light) and even light yellow. The streak is yellow-brown without any indication of red. Excellent cleavage. As montroydite contains 92.74% mercury, it is very heavy. Found associated with eglestonite and terlinguaite and was named after Mr. Montroyd Sharpe, one of the owners of the Terlingna mines.

Mosesite[5]**:** Isometric. A mercury ammonium compound containing chlorine, sulphur trioxide and water. Near Kleinite in composition, but distinct from that mineral in certain reactions. Color lemon-to canary-yellow. Streak pale

[1]Dana's System, Appendix 2, p. 71.

[2]Dana's System, Appendix 2, p. 37.

[3]Dana's System, Appendix 2, p. 50.

[5]Dana's System, Appendix 3, p. 53.

yellow. Hardness 3+. Translucent. Found sparingly as minute octahedrons and named after Prof. A. J. Moses of New York City.

Pyrite: Common and often associated with cinnabar.

Terlinguaite[6]**:** Monoclinic, Hg_2ClO. Occurs in three forms: as small prismatic crystals, as a crystalline crust; and as a powder. Color is sulphur yellow with slight greenish tinge; streak lemon-yellow and both becoming olive-green on exposure to light. H. 2-3. Sp. Gr. 8.7. It is usually associated with calcite and eglestonite; sometimes native mercury is also present. Named after the locality, Terlingua, where it was first found.

Methods of Recovery

There are two principle methods of recovery of the mercury. One is by retort and the other by furnace. Retorts are usually in batteries of 6 or 12. They consist of tubes of cast iron of ten or twelve inches inside diameter and about seven feet long. They are fitted in a furnace side by side in which the fire travels underneath to the last one and passes around it and back over the top and up a smokestack in the front. One end is closed with the exception of an iron pipe about three inches in diameter and eight or ten feet long, which is used to condense the mercuric vapor which drops out in a trough or iron pot. The other end of the retort has a larger extension of six inches or more, with two heavy cast iron lids for seals. The ore is broken up and placed in sheet iron trays that are half round and just fit into the retort. There are usually three to the tube or retort. About one pound of dehydrated lime for each pound of quicksilver content in the ore is placed in and well mixed with the ore. This is for flux, as the sulphur combines with the lime and liberates the mercury as it is driven off by the heat. When the retort is charged it is sealed in with the lids and luted in with mud so as to hold the fumes in so they will pass through the condenser pipe. The tubes must not be over heated. Usually a gray or very dull red heat is sufficient. The charge is left in from 12 to 24 hours for a good recovery. Owing to its very small capacity and the fact that it takes more fuel than a furnace, and just the same number of employes as a furnace, it is not an economical method of recovery. However, where the ore is rich and capital lacking to build a furnace, or where the amount of ore is small, but of sufficient richness, it pays very good dividends.

The furnaces are of many types. Three types are used in this district—the Scott, Nichols-Hereshoff roaster, and the Gould Rotary. The Scott, while more expensive to erect, is much the cheapest to operate, and the writer believes is the most efficient. Especially where much fines and dust is an ore content.

The ore is crushed to two inch minus for all types of furnace. No lime or other flux is used with the ore as there is sufficient oxygen in the hot air passing over the ore to oxidize the sulphur content.

The condenser systems, however, collect considerable dust and soot which has to be run through the retorts to make a total recovery of the mercury. If properly handled many furnaces make from 98 to 99% recovery. The cost of furnacing a ton of ore ranges from 85c to $2 per ton, depending upon the capacity of the furnace and its type. The rotary and roaster types of furnace are mechanically operated, while the Scott is operated by the gravity method. The ore is loaded from the top and discharged into a car at the bottom after being roasted. There are no furnaces doing a customs business in the district, as each mine has its own furnace, and most of them of insufficient capacity to take care of their own production.

It is noteworthy to record that the quicksilver produced in the Terlingua district is extremely pure; there being only a trace of gold in it. In many

[6] Dana's System, Appendix 2, p. 104.

other localities it is usually combined with lead, tin, antimony, arsenic, zinc or other impurities. When antimony or arsenic is present in the ore, it is very difficult to refine.

The reason that the district has not developed as it should is that in the past it was far from transportation and with very bad roads to get equipment and supplies over. However, in the last few years the roads have been wonderfully improved and the truck has solved the transportation problem. You can get supplies delivered here by truck from El Paso or San Antonio in much less time and just as cheaply as if a railroad reached the district. Therefore there is now considerable interest being shown in the district and indications are that much activity will take place in the near future. It has only been the richer outcrops that have been opened up and worked in the past and it is the opinion of the writer that large bodies of ore are yet to be developed. The fact that the district has produced more than $50,000,000 in the past and that much property lies still untouched, and as yet, the whole district has only been scratched, the real future lies before it.

Acknowledgment

The writer is indebted to Mr. Peter Zodac, Editor of **Rocks and Minerals**, for his kind assistance in preparing this article.

Editor's Note: A flask contains 76 lbs. of mercury and is valued roughly at $76.00 ($1.00 a lb.).

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SOME MINERALS OF THE GILLETTE QUARRY, HADDAM NECK, CONN.

By STERLING G. GILLETTE

Since the year 1899 when the Gillette quarry was opened for the purpose of mining feldspar for the market, it unexpectedly produced many varieties of valuable minerals from the beginning of its operation.

At that time, colored tourmalines were but little known, being found only at Paris, Maine. When they were found here in considerable quantity in green, blue, red, pink, and straw colors, it was quite some time before they were classified and named. In this matter great assistance was obtained from Prof. Wm. North Rice who at that time was Professor of Mineralogy at Wesleyan College in Middletown, Conn. Mr. Laper, then curator of Wesleyan Museum, also rendered valuable assistance in the classification and naming the other varieties of minerals found besides those already mentioned.

Aquamarine beryls as well as green and rose beryls were found, the aquamarine and green in abundance but only 10 large rose beryls were found during the entire length of the operation of the quarry. Aquamarine beryls have become very popular during the last few years as cut gems in jewelry. Among the other 20 different minerals found at the Gillette quarry were apatite, columbite, cookeite, fluorite, kunzite, lepidolite, and uraninite.

Lepidolite which occurred at this quarry in crystallized form is found elsewhere in masses and mined for medicinal purposes. Fluorite is used in cancer treatment, and uraninite is well known as the mineral from which radium is obtained.

The tourmalines found here were at first sold to dealers and collectors, then sold exclusively to a Mr. Schernikow, a dealer in South American emeralds, who later operated the quarry for several years under a royalty lease with the owner.

In this quarry, apatites, tourmalines, and other perfectly terminated crystals were found in pockets. These pockets were generally found near the dividing veins usually in the conglomerate feldspar but sometimes they also occurred in the clear veins of the feldspar; they varied in size from that of an egg or less up to a barrel or larger. The pockets were formed with an inside lining of quartz crystals and were usually about half full of decomposed rock formation. Always wet, the minerals found in the pockets were standing on end and unattached to any matrix. In some pockets there were found as many as 600 crystals of tourmaline ranging in size from that of a needle to that of a pencil or larger.

Beryls were always found attached and it was seldom that a doubly terminated crystal was found.

As to the sale price of minerals found at the Gillette quarry, it may be said to have exceeded the sum of $25,000. What the commercial value may have been it is impossible to say but it is reasonable to suppose it was more, very much more than the sale price obtained.

****

Editor's Vote: In its day, the Gillette quarry produced so many fine minerals, beryls and tourmalines especially, that the town of Haddam Neck became famous the world over. Though the quarry is now abandoned and overgrown with trees and bushes, it is always worthy of a visit as with search some interesting minerals may be found. Through the courtesy of Mr. Sterling G. Gillette, whose father Mr. M. P. Gillette first opened up the quarry, the Editor had the privilege of visiting and examining the old workings a number of times and an article, descriptive of the many minerals found there, will appear in **Rocks and Minerals** in due time.

JOHN DOE AMONG THE DINOSAURS

A STUDY OF MUSEUMS OF NATURAL HISTORY

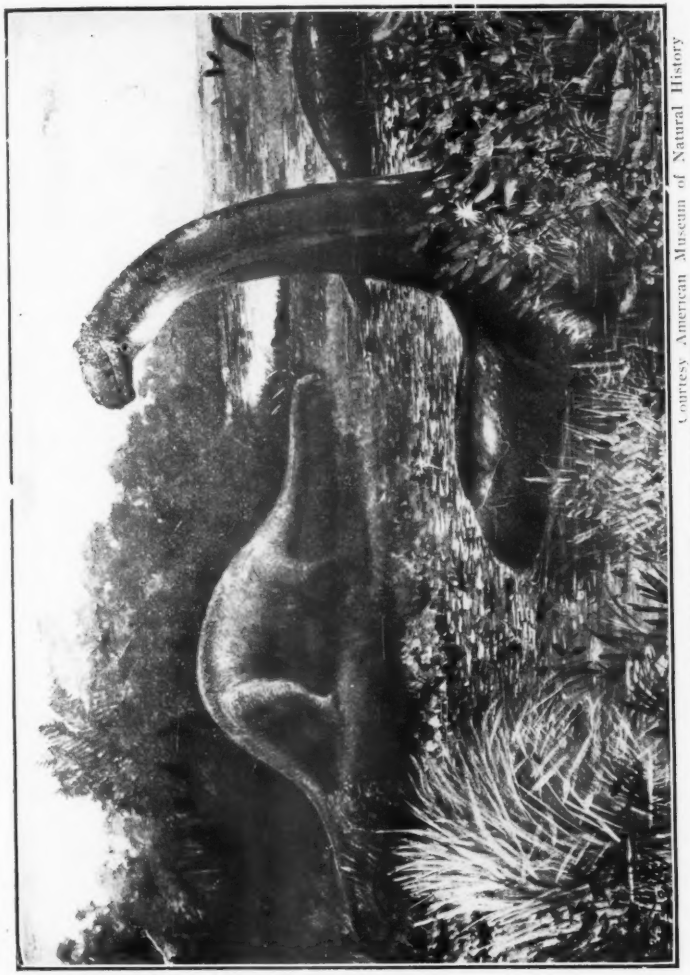
By WALTHER E. P. HUEBNER
Professor of Geology and Physiography

EDITOR'S NOTE: This is the first of a series of articles on Geology and Physiography written by Prof. Huebner for **Rocks and Minerals.** Mr. Huebner who has been a Professor of Geology and Physiography for sixteen years in Junior Colleges in Germany has now made America his permanent home and is a citizen of the U. S. He came over in 1930 and has ever since been engaged in geological research work the outcome of which is his recent book "A COMPLETE NOMENCLATURE OF GEOLOGY AND ALLIED SCIENCES". English-German and German-English, containing well over 50,000 terms and which is now in the hands of a well known New York publishing house.

In discussing the Museums of Natural History in our country it is but fair to state in the beginning that there is nothing finer in the world than the exhibits shown in our museums. That they stand unmatched is due first to Nature's lavish endowment of our country millions of years ago, second to the daring spirit of explorers in the four corners of the globe, and finally to the scholarly work performed in the laboratories of the museums. Neither brain, sweat nor money has been spared to make our museums what they are today. So there really is much to admire in our museums whether you have in mind the colossal exhibits of our great cities or the smallest haphazard collection of show pieces attached to the Department of Geology in many of our colleges. Each is individually a priceless treasure trove collected and assembled for the purpose of educating Mr. John Doe, the broad masses, the visitors who flock—or DO NOT flock—daily into their sacred halls.

But here the trouble starts. If you ask the director of any Museum of Natural History which task requires greater askill: to mount an 80 ft. skeleton of a dinosaur or to balance his budget—he will answer unhesitatingly that the budget presents the greater problem. It is the lack of funds that causes him the greatest headache. From what source does the necessary money come? Aside from relatively small federal and municipal appropriations the bulk of funds is contributed by the public, by Mr. and Mrs. Everybody who pay according to their means and according to their INTEREST in the museum. Now, as a matter of fact, most people are NOT interested in the museum. They willingly pay $25 annually for their "movies"; why not something, too, toward their museum? Because the museum does not offer them enough to loosen their dollars. This sounds paradoxical in the face of the statement made above that our museums have the finest exhibits in the world. They have—the goods. So has every reputable manufacturer. But he knows that SELLING does the trick. Does the museum sell his customers—the visitors, the laymen, the broad masses, John Doe? Emphatically NO, in spite of all laudable efforts recently to make the museum popular. Why does the museum fail to sell the public?

Let us see what happens to John Doe during a visit in the museum. First of all, why does he come? He comes because time is heavy on his hands and he has nothing "better" to do, and because he is—curious. Now that is all we can demand of him, as curiosity is the mother of progress. We follow him right into the halls of Geology and Paleontology, most fascinating for Mr. John Doe who has heard a lot about FOSSILS and DINOSAURS and EVOLUTION, although these things are rather vague and befuddled in his mind. Above all, he likes to find out whether Man really has "descended from monkeys" as



Courtesy American Museum of Natural History

BRONTOSAURUS, THE THUNDER REPTILE

Reconstructed by Charles R. Knight. Shown as dwelling in the water in which these great creatures are supposed to have passed most of their time, feeding upon water plants.

he dreads; his grandfather, anyway, still looks to him quite "normal:" Now he is "doing" the museum. Upon entering he is greeted by a deadly silence intensified by the presence of a peculiar scent in the still air conveying to his senses that he has left behind the pulsating Life whence he came and entered the realm of Death. Huge skeletons mounting right up to the ceiling are staring at him everywhere, and the monotony of endless rows of glass cases levels him almost as flat as they are. Still nothing daunted, yet almost on tiptoe, he passes from exhibit to exhibit filled with a holy respect, and feeling like a dwarf among his more or less illustrious "ancestors" of the dim past.

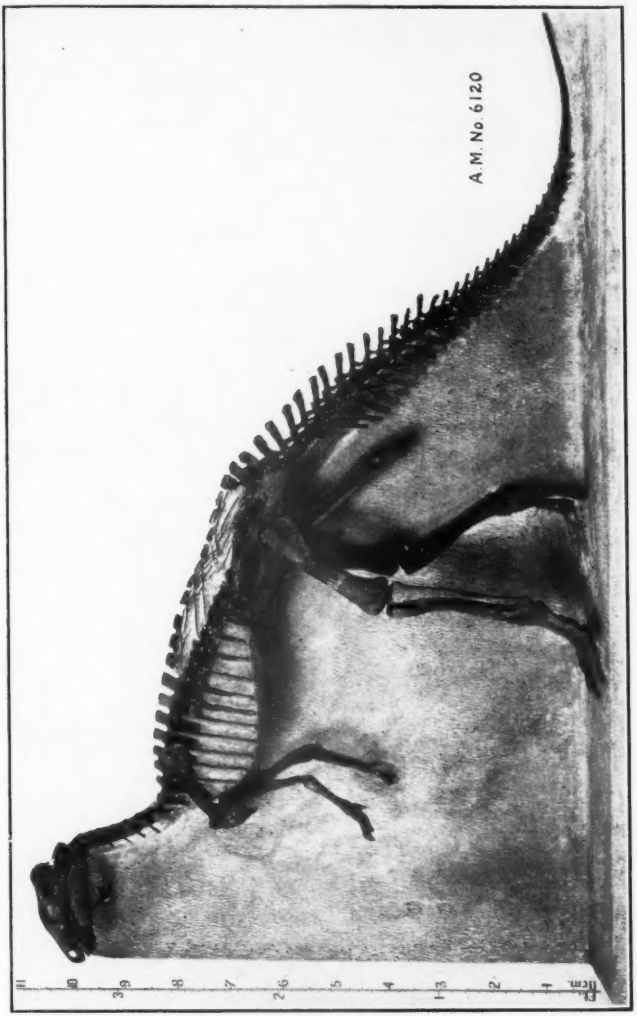
Now he detects a label and starts to read while the monster is towering above him. Alas! The labels do not help him much. Instead he sees himself bombarded with terrible words, ideal for a crossword puzzle. "Labyrinthodonts," "Multituberculates," "Carnassials," "anteroposteriorly," etc., etc. are certainly words to scarce anybody away. Helplessly he flounders over to the next beast. Whether this is the exhibit he should look at next or not he does not know and, by now, he does not care. Another array of formidable terms greets him here, and there, and everywhere, as he staggers on as in a dream. When he first came in, he felt shy and vague; then he became confused and bewildered. Now he is frightened, and "Tyrannosaurus Rex" seems to grin at him. But as a civilized man he keeps his "decorum" and just leaves, calm and indifferent outwardly, haunted and disappointed inwardly, and thanks his heaven when he is out in the street and Life has him in its fold again. And away he goes, probably never to return. All that is left in him is a dull remembrance of dusty stones and bones and meaningless, unpronounceable "jawbreakers," which after a few days of haunting mercifully sink into oblivion.

Poor Mr. John Doe! His curiosity, this precious spark of instinctive inquiry, instead of having been kindled to a warm fire of understanding, is woefully and wilfully killed by circumstances! A lost customer of a good cause! And for him, especially, the museum has been built. What dividend was paid by all the costly investment? None, whatsoever. All the brain, sweat, and money spent in Exploration and Research, so admirably represented in our museums, proved futile in his case—as long as EDUCATION still lags behind so sadly.

Why, if this happens every day, our museums will be empty very soon, and our priceless exhibits will slumber again unmolested as they did eons ago. In fact, they do, and not a few of the museums are empty, except where a great metropolis pours into their halls an inexhaustible supply of new idlers every day.

Something was wrong with the way our best customer, Mr. John Doe, was handled. What was it? This is THE problem, but simple is the solution. First of all, take Death out of the exhibition halls. Expel frosty cheerlessness, chase away paralyzing silence, spread cheer and human understanding, treat our customer as—what he is in science—a child. How? The next time John Doe comes in for a visit, let him be greeted at the door of each major hall by a cheerful man who, though scientifically trained, knows a thing or two about psychology. Let that man gather a small group of visitors and go with them through the exhibits. Not as it is done in the British Museum, the Louvre in Paris, or the Imperial Castles in Germany where a uniformed "guide" acts as a living prayer mill dragging after him a crowd, part of which arrives at each exhibit or show piece just when he is through "explaining" it. Give them a man of deep human understanding who is able to spread cheer and life among the dead and create that atmosphere which is necessary to dispel all uneasiness and mental awkwardness of the visitors. Let him talk to them in their own language, devoid of all scientific terms, about various fundamental things of common interest concerning the exhibit while standing around it. Do not allow him to deliver a "pep sales talk" learned by heart and good for everybody and everyday, but rather a score of different, simple, little talks that will satisfy the first curiosity and make his listeners eager to learn more. They get a real thrill out of it and are thankful from the bottom of their hearts. They are so'd, they are your customers, and the museum will get the benefit of it.

Secondly, place for Mr. John Doe on each exhibit a label which has its own color and is written especially for him avoiding all scientific terms—even at the cost of less information. This will save him a lot of embarrassing questions and greatly help his understanding.



Courtesy American Museum of Natural History

CAMPTOSAURUS—A small Jurassic Dinosaur—a plant eater standing about four feet high. (The Museum of Natural History has something wonderful to sell to the public and they are eager to buy if it is made palatable for them. So the museum may fulfill gloriously its third big mission—EDUCATION.)

If this method is followed in each Museum of Natural History—the initial cost is small compared with other expenses for education—then the small museums will cease to be empty and the large ones will enjoy an ever-increasing following of enthusiastic and grateful laymen who will cheerfully contribute their share of money toward their benefactor, the museum. This, then, will not only make the initial investment of spirited guides in each hall a SELF-PAYING proposition, but will also BALANCE THE BUDGET favorably for ever.

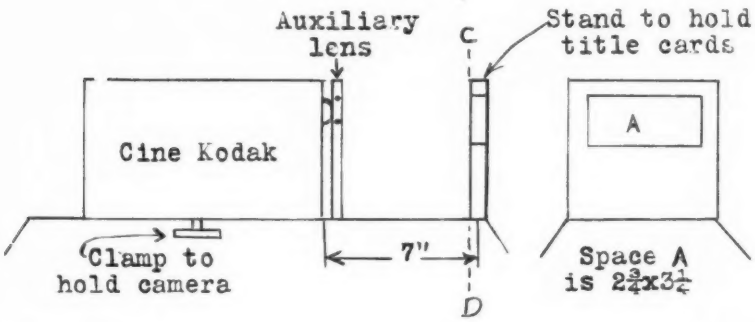
MOTION PICTURE PHOTOGRAPHY OF MINERAL SPECIMENS

By J. K. FISHER

The beginning of all this was an irritation felt by the writer over an apparent lack of good pictures, particularly good color pictures of mineral specimens. I have often written the National Geographic Society suggesting that the making of color pictures was a valid field for their work but although one can find birds, bugs, bees, Chinese, Senegalese and Portuguese, all fully recorded and in magnificent colors, one looks in vain for any evidence that mineral specimens are a branch of physical geography.

I have long been interested in photography in an amateur way. During the summer of 1936, I secured a motion picture camera, a Cine Kodak Model 25 (list price $46.50). This uses 8 mm. film ($2 a 50 ft. roll in black and white and $3.50 a 50 ft. roll in color film). A relative, who had a Cine also, bought a titler. A titler is a device for making titles to accompany and describe the various scenes on the film. I should have said that the Kodak Company only recently put color film in the 8 mm. size on the market.

Sometime last fall these various items; my irritation in not having seen color pictures, the newly marketed film, and the titler suggested themselves in an arrangement that might be the answer to my problem. If a color film was used and a mineral specimen placed (i.e. held) in the space where the title card was usually placed, then maybe a person could get a color movie of the mineral. The specimen held in one's hand could be moved about, presenting to the camera various attractive features. The question was—would it work?



The mineral is held in space A; as nearly as possible have face of mineral parallel with plane C-D. Pieces larger than space A may be held in the opening and thus be photographed.

Without an auxiliary lens and under the best circumstances, one can get clear pictures at a distance of 18" from the camera. For mineral work there would seem to be a place for another auxiliary lens which would bring objects of say 12"-14" from camera into focus and would give on area of say 4"x9" in which to hold the mineral.

During November, 1936, I took a short strip of film in black and white. The results exceeded all expectations. I could scarcely wait to make the grand test, the test of color. This test was finally made during the Christmas holidays. When I received the developed film from the mailman and while threading it into the projector, I was truly excited. I felt like I imagined a person felt who thinks he was on the verge of a discovery. THE PICTURES WERE ALL I EXPECTED AND MORE. They were excellent photographs both as to mineral form and to color. Incidently I am in no way connected with the Eastman Kodak Company.

Possible uses of this motion picture color photography suggested themselves in many ways. It would be possible to photograph one's interesting specimens and to swap reels with other collectors; thus the best specimens could be viewed without damage to them. Noted minerals in famous collections could be photographed by a commercial company and the reels loaned or copies sold; in this way nationally and internationally famous mineral collections would be available to the public—and their use to museums and schools is obvious. Also it would debunk the person who has the world's best specimen of this and that but which no one but himself has ever seen.

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FOSSIL PEARLS

By W. E. HOWARTH
National Museum of Wales

In the September number of "Rocks and Minerals" you enquire for information concerning fossil pearls. On this subject a brief note occurs in the 3rd edition of Bauer's "Edelsteinkunde" (edited and revised by Schlossmacher 1928-30). A free translation of the note runs as follows:

> "Rare discoveries of fossil pearls have been made in England and Texas; the pearls were formed by molluscs during former geological periods."

As far as England is concerned, I can confirm and amplify this statement because we have specimens of fossil pearls in the collections of the National Museum of Wales, Cardiff, Great Britain. They are nacreous spheres 1½-3 millimetres in diameter in bluish-grey London Clay (Eocene Tertiary age) from Alum Bay in the Isle of Wight off the south coast of England. One blister pearl is attached to a shell fragment insufficient for identification, but the accompanying fauna leads one to suppose that the pearls are those of molluscs capable of living in brackish water, rather than from members of the family Ostreidae (oysters). At the horizon where the pearls are found, innumerable specimens of **Modiola** occur—a genus belonging to the same family as the common British edible mussel **Mytilus edule** which is capable of producing pearls.

Whilst on the subject of calcium carbonate, one might mention the calcite "peas" which are found in caves in limestone when the circulation of water is too great for complete evaporation but not sufficient to give rise to running streams. In the stagnant pools on the floor of the cave a skin of calcite "ice" is formed on the surface of the water whilst at the bottom of the pools are found large numbers of spheres of calcite averaging about one-fifth of an inch in diameter. These have a faint sheen on the surface due to innumerable minute crystal-faces and on this account have been submitted to me as pearls. One can easily account for the stalactites and atalagmites, and for the calcite "ice," but the occurrence of these calcite "peas" has always been a mystery to me.

N.G.C. Adopts ROCKS and MINERALS

The National Geological Club, whose headquarters are at Kimmswick, Mo., has adopted **Rocks and Minerals** as its official journal. The purpose of the Club is the exchange of notes, letters, maps, pictures, specimens and articles—on mineralogical and geological subjects. Under the guidance of its founder and president, Mrs. Daisy Patricia Stockwell, of Mt. Olympus, Kimmswick, Mo., the Club has grown steadily since 1930 when it was first organized so that it has a large membership all over the country. Mrs. Stockwell is also a valued member of the Rocks and Minerals Association and she has prepared for **Rocks and Minerals** a number of interesting articles on her state. Furthermore she assures us that she will solicit articles from the club's members and will always send us any items of interest which may be submitted by members in the course of exchanging.

We congratulate Mrs. Stockwell and the National Geological Club in adopting **Rocks and Minerals** as their official journal and feel that this affiliation will be of mutual benefit to both the Club and magazine.

The "Devil's Corkscrews"

Nature produced huge earthy corkscrews long before man existed and had any reason for making metal ones. These curious objects, named "daemonelix" or "devil's corkscrews," constitute a geological mystery. Science has been unable to determine satisfactorily the origin of these strange spiral earthy formations which are found in the bare bluffs, buttes and canyon walls of northwestern Nebraska. Four large specimens are on exhibition in the department of geology at Field Museum of Natural History.

The devil's corkscrews were first noted by cowboys some four decades ago, and were given their name by these discoverers, who called them also "stonescrews," "twisters," and "fossil worms." Scientists have since made extensive studies of them, but they are still as much of a puzzle as ever, states Sharat K. Roy, curator of geology. Various theories have been presented, ascribing their origin to natural casts of animal burrows, plants, and mineral accretions, but none have met critical ananlysis.

The corkscrews vary in form, size and direction of twist, but are always found upright. The spirals twist sometimes to the left, sometimes to the right, and are exceedingly uniform in both diameter and pitch. Those at the museum range from two to seven feet in height, and are about four inches in diameter. They were collected by an expedition led by Curator Elmer S. Riggs.

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John A. Grenzig
229 Adams St. Brooklyn, N. Y.

DISCOVERY OF A MASTODON SKELETON NEAR AURORA, ILL.

By MRS. FLORENCE ANDERSON

It was very refreshing, after one of those hot days last summer, to ride around the beautiful little lake bordered by gracefully drooping trees and many shrubs with birds singing everywhere. A rustic bridge from the edge of the lake to the island in the center, with here and there a fisherman, all added to this calm and peaceful scene. Who would believe that this lovely lake was all man-made during the past three years.

Yes, a short time ago this region was a swampy part of Phillips Park on the outskirts of Aurora, Ill., a city of 46,000, and which is about 30 miles west of Chicago and 12 miles from my home in St. Charles.

During the construction of the lake by CWA workers, four bones, believed to be those of a mastodon, were uncovered. One of the bones appeared to be a portion of a hip bone; another of a shoulder blade. This find aroused considerable interest among the men.

A few weeks later the huge skull of the mastodon was found. The workmen had been leveling off a high piece of ground when their picks caught on what appeared to be a brown rock. Further leveling showed it was not a rock but a huge skull, and it was lying upside down in the marl which occurred here in large quantities. (A team of horses was used to pull it out.) When excavated, the skull was found to be 3 ft. 9 in. high, 2 ft. wide, and weighed 350 lbs. The rear molar surface length was 9 in. The tusks and lower jaw were missing but empty sockets showed that the tusks had diameters of nearly 7 in. each and were 10 ft. in length. A tusk found later was 7 ft. long. Other bones were found 75 ft. away from the skull.

A paleontologist from a large museum examined the find and verified the statements made. Furthermore he stated that the bones were probably 10,000 years old and that the mastodon lived during a trophical climate following the glacial period. Mastodons belong to a group of huge animals, related to the elephants, which became extinct thousands of years ago. The skull is now on exhibit in the Green House in Phillips Park.

So, while some of us were rather dubious about the huge animals in the past, here we have proof that they did rove through our beautiful Fox River Valley in Illinois.

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NEWARK MINERALOGICAL SOCIETY

The Newark Mineralogical Society held its 170th regular meeting on Sunday, October 3, 1937, with the President, Mr. Vincent Giordano in the chair. After the reading of the Minutes of the May meeting, and the disposal of the ordinary business of the Society, the members were entertained by a symposium on Summer Collecting. Mr. Ernest A. Maynard gave a most interesting and instructive talk on "The Minerals of Florida" with many beautiful specimens, including an unusually attractive number of geodes. Many other specimens of interest were on display.

The applications of three mineralogists for membership were received and will be acted upon at the annual meeting in November.

The 171st regular meeting will be held on Sunday, November 7, 1937, to be followed by the 22nd annual meeting, at which meeting officers and trustees will be elected for the coming year. The terms of the following officers expire on November 7th.

Vincent Giordano, President,
John Reiner, Vice-President,
Herbert L. Thowless, Secretary,
William H. Broadwell, Treasurer,
and
Paul Walther, Trustee.

The program for the November meeting will consist of a symposium on "Lead Minerals," illustrated with specimens, and the program will be opened by Mr. Louis Reamer.

A Block of Salt From Palestine

An ancient block of transparent rock salt from Palestine, of the same type as that into which Lot's wife was transformed according to the Bible story, is now on exhibition in the department of geology at Field Museum of Natural History. That the block is old enough to have been contemporary with Lot's wife was pointed out recently by Chief Curator Henry W. Nichols, who, however, considers the biblical tale purely symbolical.

This specimen of salt comes from the shore of the Dead Sea, near the Jeban Usdum, a name which means "mountain of salt." A cave in this mountain contains many stalactites of rock salt, one of which has also arrived at the museum and has been added to the exhibits. The specimens were presented to the institution by Morris G. Morrison for many years a resident of Palestine.

With Our Authors

In answer to recent appeals for a short history of some of our authors we are starting the ball rolling with a brief description of J. K. Fisher.

Professor Huebner's history appears with his article in this issue.

When submitting for publication in **Rocks and Minerals** don't forget to add a short author's history.

John Kenneth Fisher, age 37, graduate University of Pennsylvania, school teacher in Upper Darby Junior High School. Amateur mineral collector and sponsor of a Boys' Mineral Clubs in U. D. Jr. Hi, member Philadelphia Mineral Club; married; 2 children, boys, aged 1 year and 3½ years; address 178 St. Francis Road, Upper Darby, Pa.

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Amateur and professional lapidaries are cordially invited to submit contributions and so make this department of interest to all

A SUGGESTION TO AMATEUR CUTTERS OF CABOCHONS

By DR. FRANK B. WADE

Any amateur cutter of precious and semi-precious stones who has acquired the skill to cut the ordinary cabochon forms will find it an interesting task to try to cut transparent colored stones such as amethyst, citrine quartz, garnet, olivine, or the various colored synthetics to forms and shapes which simulate the facetted stones but with curved surfaces both above and below the girdle in place of the series of facets which are usually employed. There have been on the market for some time stones cut with what has been called a "buff" top, a smooth curved top without facets somewhat resembling a convex lens, and which indeed serves the purpose of such a lens in causing light from the front of the stone to converge on the region of the culet of the stone. What is suggested is just such a top, but, instead of the facetted back, which few amateur lapidaries have either the skill or the appliances to produce, a back with nearly the same general contour as a well cut facetted stone would have, is to be cut, but its surfaces are to have smooth, rather flattened curves as shown in figures 1 and 2. The contour of the front of the stone may be round, or square, or "square antique," (having rounded corners), or oblong (cushion shaped), or cushion antique, Fig. 3 or triangular, or hexagonal, etc. The angular shapes with corners more or less rounded probably give better results than the round shape, in this cutting, because they give variety, by the alternation of bright surfaces of total reflection from the back, with narrow dull lines, where the back corners fail to reflect as much light as the surfaces. With a square stone, for example, the bright areas may seem to give a maltese cross effect. The principal merit of such a style of cutting as is suggested is that much more light is returned to the front, after total reflection, in a well shaped stone of this kind than can possibly be returned by any shape of cabochon that can be devised, just as the diamond brilliant is much more effective than any "rose cut" diamond and for the same optical reasons (which can be found well worked out in Tolkowsky's "Diamond Design," Spon & Chamberlain, 120 Liberty St., New York). Moreover the depth of color of a stone, cut as suggested, is much greater than that of any cabochon of similar size cut from the same material. Indeed it is possible to get a richer color effect than could be had in a facetted stone from the same material because there is bound to be less of what is called "brilliancy" to divert attention from the color of the stone. For brilliancy, flat facets are a prime requisite, and no great brilliancy should be expected of the cut which we describe, although there will be considerable total reflection from the back surfaces, if the angles of the cross section of the stone are well designed. To get suitable proportions for this, study any effectively cut brilliant, or, better, emerald cut (step cut) stone and measure the depth

and the width (and length if not round or square) and note also the position of the girdle as to its depth below the table, and shape your material similarly. To make the matter still clearer you should try to get just what you would get if you took a well cut stone of emerald cut and gently ground off all the edges of the facets so as to just barely cause them to disappear and then you polished all the surfaces.

If you have to deal with a material such as amethyst or synthetic blue sapphire which has its color badly segregated you can get very much better color effects in the new cutting than in cabochon form by simply arranging to place the best spot or zone of color in, or about the culet. The whole front of the stone when polished will then have that co'or. The oriental cutters of rubies and sapphires have long made use of this optical principle even if they had to misplace the culet considerably, in order to get color and to save weight at the same time.

A word to those who have not tried the synthetic stones may be in order, as most amateurs have difficulty in polishing such hard material. After grinding and sanding with carborundum wheels (or laps) and cloth, use diamond dust on the **end grain** of a small boxwood lap at high speed, but do not bear on hard, as you will overheat the stone and "burn" the surface. The diamond dust is so supremely hard that no considerable pressure is necessary. The end of the grain of the hard wood holds the diamond dust better and olive oil (or other oil of similar viscosity) should be used to lubricate and to hold the valuable dust from flying off the lap. A large spool (probably of birch wood) can be used nicely if you do not have boxwood. Use diamond dust that has had all the coarse scratchy particles settled out of it (you can grade the dust yourself, if you pound up your own bort diamonds, by shaking the dust in a six inch test tube with olive oil and then letting it settle for 15 minutes. These first particles to settle may be used to "charge" a diamond "saw" for slicing stones after which pour off the muddy oil into a second six inch test tube and settle for one hour (These second settlings are to be used to give the first surface to the stone) then pour off the still muddy oil into a third test tube and

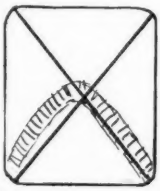

Fig. 3.

Fig. 1.

Fig. 2.

The proportions shown above are exactly those of a synthetic blue sapphire cut by the author. The actual dimensions as measured on Moe's diamond guage are 37 long, 31 wide and 23 deep. The weight is 7.16 carats. All the blue color is in a narrow curved band (which was at or near the surface of the boule, as usual) as sketched in Fig. 2 and in Fig. 3.

settle 24 hours. The settlings in this tube used on the opposite end of your spool, will give you your final finish, and a lovely surface it is too, if you stay with it patiently until it is finished (which will take quite a bit of time even wth a liberal use of fresh diamond dust and oil from time to time). Even after 24 hours the oil will be more or less muddy but the content is too fine and of too small a weight to be worth trying to recover or use. Dealers in industrial diamonds can furnish diamond dust already graded if you do not care to make and grade your own. Tell them what you want to use the dust for and ask for a surfacing grade and a finishing grade.

Such a stone as is suggested in this article can, if well made, become "a thing of beauty" and a "joy forever."..

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933

Of ROCKS and MINERALS published MONTHLY at PEEKSKILL, N. Y., for OCTOBER 1st, 1937. — State of New York, County of Westchester.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared PETER ZODAC, who, having been duly sworn according to law, deposes and says that he is the EDITOR and PUBLISHER of ROCKS and MINERALS and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management of the aforesaid publication tor the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, to wit:

1. That the name and address of the publisher, editor, managing editor, and business manager is PETER ZODAC, PEEKSKILL, N. Y.

2. That the owner is: PETER ZODAC, PEEKSKILL, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: NONE.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholdr or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

PETER ZODAC

Sworn to and subscribed before me this 11th day of October, 1937.

THOMAS C. MacPHERSON
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An Early Gold Rush To Baffin Land

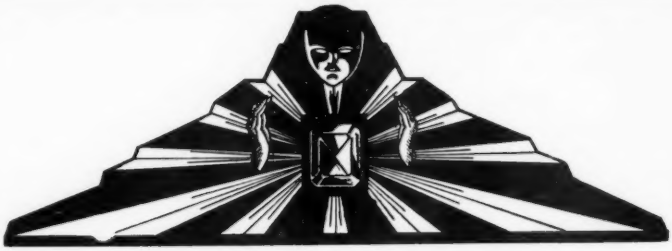
The story of an almost forgotten gold rush which took place some 360 years ago, and ended in a financial disaster in which Queen Elizabeth and many of England's wealthy noblemen lost the equivalent of $3,000,000, is recalled in a publication issued recently by Field Museum Press. The booklet, entitled "The History and Petrography of Frobisher's 'Gold Ore,'" is a report on some of the results of the Rawson-MacMillan Subarctic Expedition of Field Museum of Natural History. Sharat K. Roy, curator of geology, who was a member of the expedition, is author.

Mr. Roy's paper on Frobisher's "gold ore" is only partly technical in character, and the larger part is of considerable interest to lay readers. It tells how the MacMillan expedition came upon the ruins of the house, the mining pits, and the improvised shipyard of Sir Martin Frobisher who, between 1576 and 1578, led three expeditions, two for gold, into the forbidding icy regions of northern Labrador and Baffin Land. Digging in the ruins, members of the museum expedition unearthed fragments of brick, plaster, coal and porcelain which were undoubtedly brought over from England, and are indisputable proof that the ruins are of European, and not native Eskimo or Naskapi Indians habitations. The expedition collected also specimens of the rocks mistaken for gold ore by the early explorers.

The story of Frobisher, related by Mr. Roy, is one of the most romantic in the history of quests for riches. Frobisher, with the financial assistance of a few friends, first sailed from England in 1576, in search of a northwest passage to Cathay and India. This was eighty-four years after Columbus's first voyage to America, and forty-four years before the Pilgrims ventured forth. Frobisher had two tiny vessels, the "Gabriel" and the "Michael," and 35 men. Arriving in Labrador, they proceeded up the coast to what is now Frobisher Bay in Baffin Land. Five of the men were captured by natives and never seen again. Failing to find the passage they sought, the explorers returned to England, bringing some specimens of what the sailors called "black earth." Soon a rumor spread that this black earth was gold ore.

In the excitement that ensued, another expedition was formed. Queen Elizabeth loaned the "Aid," a larger naval vessel, to Frobisher, and gave him £1,000 to finance the quest. Men of prominence in the court also invested in the hope of gaining large fortunes. In May, 1577, Frobisher, with the "Aid," and the two vessels used on the previous voyage, sailed again with 120 men. Mining equipment was carried, and miners and refiners were included in the crews. The following autumn the expedition returned to England with 200 tons of the "ore." While conflicting assays were being made, excitement mounted higher, and a third expedition was organized, with 15 ships. Plans were made to leave 100 of the men to establish a permanent settlement in the barren land, which Frobisher had solemnly taken possession of in the queen's name. The third expedition sailed in May, 1578.

After arrival in Frobisher Bay, dissensions arose, and the idea of the settlement was abandoned. The fifteen ships, all laden to capacity with ore, returned to England in October, only to find that a final assay, since completed, had determined that the ore contained nothing but bronzy-lustered mica simulating gold.



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